

CLAIMS:

What is claimed is:

1 1. An interface for interconnecting electronic
2 components, comprising:

3 at least one single-ended data signal;

4 a differential data signal pair;

5 a receiver for detecting said single-ended data
6 signal, wherein detection of said single-ended data signal
7 is made in conformity with a common mode voltage of said
8 differential data signal pair.

1 2. The interface of Claim 1, wherein said receiver
2 comprises:

3 a differential comparator coupled to said
4 differential data signal pair; and

5 a singlential comparator coupled to said differential
6 comparator and further coupled to said differential data
7 signal pair and said single-ended data signal.

1 3. The interface of Claim 2, wherein said singlential
2 comparator sums a non-inverted signal of said differential
3 data signal pair and an inverted signal of said
4 differential data signal pair to provide a reference for
5 detecting said single-ended data signal.

1 4. The interface of Claim 2, wherein said singlential
2 comparator comprises means for summing a non-inverted
3 signal of said differential data signal pair and an
4 inverted signal of said differential data signal pair to
5 provide a reference for detecting said single-ended data
6 signal.

1 5. The interface of Claim 3, wherein said singlential
2 comparator comprises:

3 a first transistor having a gate coupled to said
4 single-ended data signal ;

5 a second transistor having a gate coupled to a non-
6 inverted signal of said differential data signal pair;

7
8 a third transistor having a gate coupled to an
9 inverted signal of said differential data signal pair; and

10 a current source coupled to a channel connection of
11 said first transistor, a channel connection of said second
12 transistor and a channel connection of said third
13 transistor, whereby said singlential comparator detects a
14 difference between said single-ended data signal and an
15 average of said non-inverted signal and said inverted
16 signal of said differential data signal pair.

1 6. The interface of Claim 5, wherein said differential
2 comparator comprises:

3 a fourth transistor having a gate coupled to said
4 non-inverted signal of said differential data signal pair;
5 and

6 a fifth transistor having a gate coupled to said
7 inverted signal of said differential data signal pair and
8 a first channel connection coupled to a resistor for
9 providing active mode operation; and

10 a current source coupled to a channel connection of
11 said fourth transistor and a second channel connection of
12 said fifth transistor, whereby said differential
13 comparator detects a difference between said said non-
14 inverted signal and said inverted signal of said
15 differential data signal pair, and wherein a gain of said
16 active mode of said differential comparator is equal to a
17 a gain of said singlential comparator.

1 7. The interface of Claim 2, wherein said receiver further
2 comprises a multiplexer for producing a data output signal
3 corresponding to said single-ended data signal, having a
4 first input coupled to an output of said differential
5 comparator, a second input coupled to an inverted output
6 of said differential comparator, and a select input
7 coupled to said output of said differential comparator and
8 an output of said singlential comparator such that said
9 output of said differential comparator is selected when
10 said single-ended signal is at an equal logic value with
11 said differential data signal pair and wherein said
12 inverted output of said differential comparator is
13 selected when said single-ended signal and said
14 differential data signal pair are at unequal logic levels.

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1 8. The interface of Claim 7, wherein said receiver further
2 comprises:

3 a first latch for coupling said differential
4 comparator to said multiplexer, said first latch having an
5 input coupled to said output of said differential
6 comparator and an output coupled to said first input of
7 said multiplexer;

8 an inverter having an input coupled to said output of
9 said first latch for producing said inverted output of
10 said differential comparator and having an output coupled
11 to said multiplexer;

12 a second latch for latching said output of said
13 singlential comparator; and

14 an exclusive-OR gate having a first input coupled to
15 said output of said first latch and a second input coupled
16 to an output of said second latch and an output coupled to
17 a select input of said multiplexer for selecting said
18 output of said first latch when said single-ended signal
19 is at an equal logic value with said differential signal
20 pair and for selecting said output of said inverter when
21 said single-ended signal and said differential data signal
22 pair are at unequal logic levels.

1 9. The interface of Claim 1, wherein said receiver
2 comprises:

3 a first differential comparator coupled to said
4 differential data signal pair;

5 a second differential comparator coupled to a non-
6 inverted signal of said differential signal pair and said
7 single ended-data signal;

8 a third differential comparator coupled to an
9 inverted signal of said differential signal pair and said
10 single ended data signal; and

11 means for selecting between an output of said second
12 differential comparator and an output of said third
13 differential comparator to produce a data output
14 corresponding to a logic value of said single-ended data
15 signal.

1 10. The interface of Claim 1, wherein said receiver
2 comprises:

3 a first differential comparator coupled to said
4 differential data signal pair;

5 a second differential comparator coupled to a non-
6 inverted signal of said differential signal pair and said
7 single ended-data signal;

8 a third differential comparator coupled to an
9 inverted signal of said differential signal pair and said
10 single ended data signal; and

11 a logic circuit coupled to said first differential
12 comparator, said second differential comparator and said
13 third differential comparator for selecting between an
14 output of said second differential comparator and said
15 third differential comparator to produce a data output
16 corresponding to a logic value of said single-ended data
17 signal.

1 11. The interface of Claim 10, wherein said logic circuit
2 comprises:

3 a multiplexer for producing said data output
4 corresponding to said logic value of said single-ended
5 data signal;

6
7 a first latch having an input coupled to an output of
8 said first differential comparator;

9 a second latch having an input coupled to an output
10 of said second differential comparator and an output
11 coupled to a first input of said multiplexer;

12 a third latch having an input coupled to an output of
13 said third differential comparator and an output coupled
14 to a second input of said multiplexer;

15 a first exclusive-OR gate having inputs coupled to
16 said input of said first latch and said output of said
17 first latch for detecting a difference between a present
18 state and a prior state of said output of said first
19 differential comparator;

20 a second exclusive-OR gate having inputs coupled to
21 said input of said second latch and said output of said
22 second latch for detecting a difference between a present
23 state and a prior state of said output of said second
24 differential comparator; and

25 a third exclusive-OR gate having inputs coupled to an
26 output of said first exclusive-OR gate and an output of
27 said second exclusive-OR gate, and having an output
28 coupled to a select input of said multiplexer, for

29 performing said selecting.

1 12. The interface of Claim 11, further comprising a fourth
2 exclusive-OR gate having inputs coupled to said input of
3 said third latch and said output of said third latch for
4 detecting a difference between a present state and a prior
5 state of said output of said third differential
6 comparator, and wherein said fourth exclusive-OR gate has
7 an output coupled to an input of said third exclusive-OR
8 gate.

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1 13. A receiver for receiving a differential data signal
2 pair and a single-ended data signal, comprising:

3 a differential comparator coupled to said
4 differential data signal pair; and

5 a singential comparator coupled to said differential
6 comparator and further coupled to said differential data
7 signal pair and said single-ended data signal;

8 a multiplexer having an output for producing a data
9 output signal corresponding to said single-ended data
10 signal, having a first input coupled to an output of said
11 differential comparator, a second input coupled to an
12 inverted output of said differential comparator;

13 a first latch coupling said differential comparator
14 to said multiplexer, said first latch having an input
15 coupled to said output of said differential comparator and
16 an output coupled to said first input of said multiplexer;

17 an inverter having an input coupled to said output of
18 said first latch for producing said inverted output of
19 said differential comparator and having an output coupled
20 to said multiplexer;

21 a second latch for latching said output of said
22 singential comparator; and

23 an exclusive-OR gate having a first input coupled to
24 said output of said first latch and a second input coupled
25 to an output of said second latch and an output coupled to
26 a select input of said multiplexer for selecting said
27 output of said first latch when said single-ended signal

28 is at an equal logic value with said differential signal
29 pair and for selecting said output of said inverter when
30 said single-ended signal and said differential data signal
31 pair are at unequal logic levels.

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1 14. A receiver for receiving a differential data signal
2 pair and a single-ended data signal, comprising:

3 a first differential comparator coupled to said
4 differential data signal pair;

5 a second differential comparator coupled to a non-
6 inverted signal of said differential signal pair and said
7 single ended-data signal;

8 a third differential comparator coupled to an
9 inverted signal of said differential signal pair and said
10 single ended data signal;

11 a multiplexer for producing a data output
12 corresponding to said logic value of said single-ended
13 data signal;

14 a first latch having an input coupled to an output of
15 said first differential comparator;

16 a second latch having an input coupled to an output
17 of said second differential comparator and an output
18 coupled to a first input of said multiplexer;

19 a third latch having an input coupled to an output of
20 said third differential comparator and an output coupled
21 to a second input of said multiplexer;

22 a first exclusive-OR gate having inputs coupled to
23 said input of said first latch and said output of said
24 first latch for detecting a difference between a present
25 state and a prior state of said output of said first
26 differential comparator;

27 a second exclusive-OR gate having inputs coupled to
28 said input of said second latch and said output of said
29 second latch for detecting a difference between a present
30 state and a prior state of said output of said second
31 differential comparator; and

32 a third exclusive-OR gate having inputs coupled to an
33 output of said first exclusive-OR gate and an output of
34 said second exclusive-OR gate, and having an output
35 coupled to a select input of said multiplexer, for
36 performing said selecting.

1 15. The receiver of Claim 14, further comprising a fourth
2 exclusive-OR gate having inputs coupled to said input of
3 said third latch and said output of said third latch for
4 detecting a difference between a present state and a prior
5 state of said output of said third differential
6 comparator, and wherein said fourth exclusive-OR gate has
7 an output coupled to an input of said third exclusive-OR
8 gate.

1 16. A comparator circuit having differential inputs for
2 receiving a differential signal pair and a single-ended
3 input for receiving a single-ended signal, comprising:

4 a first transistor having a gate coupled to said
5 single-ended signal ;

6 a second transistor having a gate coupled to a non-
7 inverted signal of said differential signal pair;

8 a third transistor having a gate coupled to an
9 inverted signal of said differential signal pair; and

10 a current source coupled to a channel connection of
11 said first transistor, a channel connection of said second
12 transistor and a channel connection of said third
13 transistor, whereby said comparator detects a difference
14 between said single-ended signal and an average of said
15 non-inverted signal and said inverted signal of said
16 differential signal pair.

1 17. The comparator circuit of Claim 16, further
2 comprising:

3 a fourth transistor having a gate coupled to said
4 non-inverted signal of said differential signal pair; and

5 a fifth transistor having a gate coupled to said
6 inverted signal of said differential signal pair and a
7 first channel connection coupled to a resistor for
8 providing active mode operation; and

9 a current source coupled to a channel connection of
10 said fourth transistor and a second channel connection of
11 said fifth transistor, whereby said differential
12 comparator detects a difference between said said non-
13 inverted signal and said inverted signal of said
14 differential signal pair, and wherein a gain of said
15 active mode of said differential comparator is equal to a
16 a gain of said singlential comparator.

1 18. A method for signaling over an electronic interface,
2 said method comprising:

3 transmitting a differential data signal pair;

4 second transmitting a single-ended data signal;

5 receiving said differential data signal pair; and

6 detecting said single-ended data signal in conformity
7 with a common-mode voltage of said received differential
8 data signal pair.

1 19. The method of Claim 18, wherein said detecting
2 comprises:

3 deriving a reference from said differential pair of
4 data signals; and

5 second detecting a difference between said single-
6 ended data signal and said derived reference.
7

1 20. The method of Claim 19, wherein said deriving is
2 comprises summing currents proportional to a non-inverting
3 signal of said differential data signal pair and an
4 inverting signal of said differential data signal pair,
5 and wherein said second detecting is comprises balancing a
6 current proportional to said single ended data signal
7 against said summed currents.

1 21. The method of Claim 18, wherein said detecting
2 comprises:

3 first comparing a non-inverting signal of said
4 differential pair to an inverting signal of said
5 differential pair;

6 second comparing said single-ended data signal to
7 said non-inverting signal of said differential data signal
8 pair;

9 third comparing said single-ended data signal to said
10 inverting signal of said differential data signal pair;
11 and

12 selecting between a result of said second comparing
13 and said third comparing, in conformity with a result of
14 said first comparing and said second comparing.

1 22. The method of Claim 21, wherein said selecting is
2 further performed in conformity with a result of said
3 third comparing.